Wireless Communities Georgia Technology Workshop

"Georgia Communities Plugging into the New Economy"

Georgia Technology Authority, June 5, 2006

Technology Workshop Webcast

Web cast address:

- **http://mediar1.gpb.org/ramgen/encoder/gov-gta/wireless.rm?usehostname**

GTA Overview: Purpose

- **Set the direction for the state's use of technology — enterprise view**

- **Make government transactions and information accessible anywhere, anytime**

- **Deliver IT services in an efficient and effective manner**

GTA Responsibilities

- **Created by the General Assembly in 2000**
- **Project management**
  - Technology projects costing $1 million or more
- **Procurement**
  - Enterprise agreements and statewide contracts
- **Planning**
  - Ensures technology projects meet agency business needs and follow enterprise approach
- **Enterprise architecture**
  - Policies and standards

Civitium Overview

- **Consulting firm exclusively focused on municipal broadband**

- **Combines technology, telecommunications, public policy, and business leadership to governmental entities**

- **Vendor and technology neutral**

- **Consultant to Philadelphia, Houston, Chicago, San Francisco, Johannesburg, Vancouver, and many others**

- **Unique approach to every initiative**

Workshop Agenda

- **Welcome**

- **Program and Application Review**

- **Break – 10:30 am**

- **Municipal Wireless Dimensions and Planning**

- **Lunch**

- **Video and Technology Overview**

- **Break – 2:00 pm**

- **Thinking Beyond the Network**

- **Closing – 4:00 pm**

Wireless Communities Georgia Program Overview

- "Broadband is the new dial-tone"
- $4 million
- Wi-Fi networks
- Awards to 3 or more communities
- Economically self-sustaining

Goals and outcomes for Wireless Communities Georgia

- Promote economic development
- Expand education
- Improve government services

Program Timeline

- **Application period — May 19, 2006 to July 7, 2006**
- **Technology workshop — June 5, 2006**
- **Application deadline — July 7, 2006 @ 2 p.m.**
- **Evaluation period — July 7, 2006 to August 25, 2006**
- **Disbursements announced — Sept 1, 2006**
- **Performance period — Sept '06 to Sept '08**
- **Program closeout — September 22, 2008**

Technical requirements

- **Connectivity for Wi-Fi equipped devices (802.11b or g)**

- **90 percent coverage indoors, outdoors**

- **Support for emergency services at 2.4 gigahertz**

- **At least one service at 1 megabit per second (DSL speed)**

- **Seeks equity in coverage to the extent economically feasible**

Eligibility

- **City, county or local public entity**
- **Minimum 25 percent match**
- **Access to infrastructure**

Evaluation criteria

- **Economic sustainability**
- **Scope of work and overall feasibility**
- **Existing infrastructure and network design**
- **Community benefits**
- **Availability of other state funds to applicants**

Evaluation team

- **GTA**
- **Department of Education**
- **Department of Economic Development**
- **Department of Community Affairs**
- **Two phases**
  - Written
  - Orals

WCG Guidance and Application

Rich Calhoun

Application Review

Application   Guidance

Microsoft Word   Microsoft Word
Document   Document

Website

http://www.gta.ga.gov/wcg

Submission Requirements

- **Application Deadline – July 7, 2006 – 2 p.m.** *All applications should be received by July 7, 2006 at 2 p.m. EDT.* **Postmarks will not be considered in judging the timeliness of submissions. Applicants should submit three copies of the completed application package signed by a person who has the legal authority to sign a contract on behalf of the Applicant.**

- **Additionally, all applicants must include 6 CDs that contain electronic copies of the application and any supporting documentation. Documents should be in Word, WordPerfect, Rich Text Format (RTF) or PDF. If any supporting documentation is on paper, please convert it to an electronic format and include it on the CD.**

Q&A and Break

Municipal Wireless Dimensions

Bailey White

Municipal Wi-Fi Overview

- **Typical Objectives**
- **Technology Employed**
- **Business Rationale**

Typical Objectives

- **Economic Development**
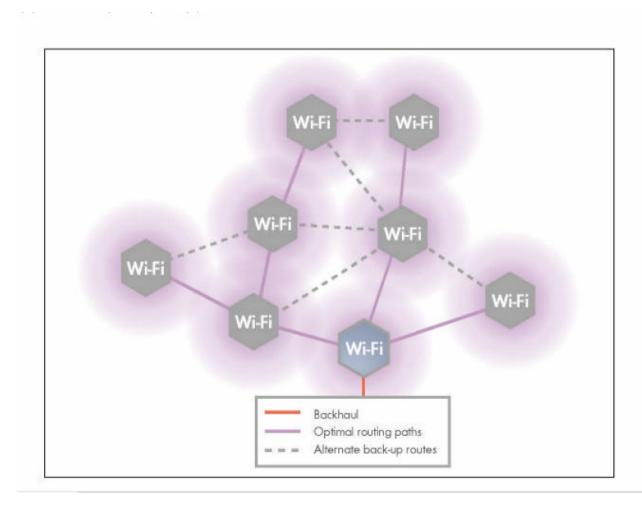- **Social Improvement**
- **Government Efficiency**

Technology Employed

- **Wi-Fi, 802.11 b/g**
- **Simple, powerful, inspiring**
- **Outdoor and indoor coverage**
- **Large and growing user device base**
- **Typically mesh**
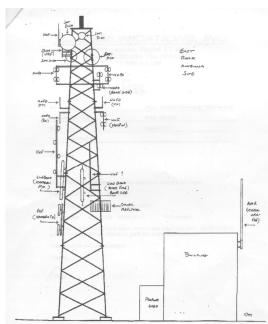- **Backhaul to internet may be another technology**
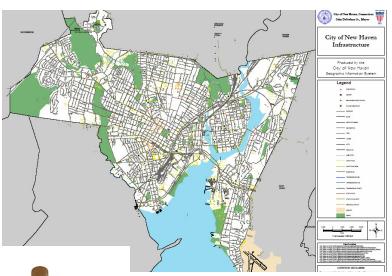
Mesh Fundamentals

Key Infrastructure – Vertical Assets

Business Model Considerations

- **Funding and Ownership**
  - Utility
  - Public Private Partnership
- **Value Chain Structure**
- **Fee Structure**
- **Governance Model**

Business Modeling

- **Capital Expense (CapEx)**
- **Operational Expense (OpEx)**
- **Services Deployed**
- **Roles and Responsibilities**

High Level Planning for a Municipal Network
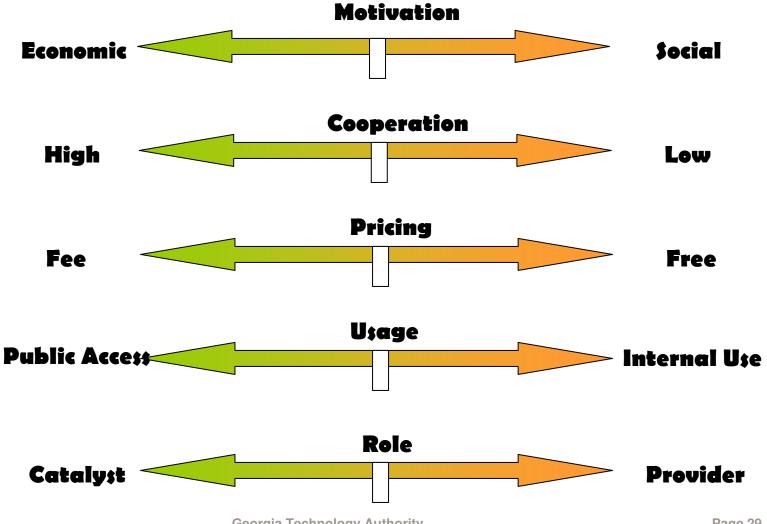
Planning Components

Vision Examples

"To create social and economic benefit for the community through the deployment of a citywide wireless broadband network."

"To strengthen the economy and transform neighborhoods by creating a digital infrastructure to help citizens, businesses, schools and community organizations make effective use of technology, while providing a greater experience for visitors to the City."

Stakeholder Feedback

Motivation

Economic ← → Social

Cooperation

High ← → Low

Pricing

Fee ← → Free

Usage

Public Access ← → Internal Use

Role

Catalyst ← → Provider

Objectives

Community Wireless Broadband Initiative
Prioritization of Goals and Objectives

Please score the following candidate goals and objectives on a scale from zero to three.

- Zero = Not a goal/objective
- One = Nice to have, expected byproduct of initiative
- Two = Important goal/objective, used to measure effectiveness of initiative
- Three = Critical goal/objective, must meet or initiative is not deemed a success

Score	Goal/Objective
_____	Improve public safety through better communication and interoperability
_____	Lower broadband prices for low-income, disadvantaged
_____	Reduce existing or avoid future government telecom costs
_____	Generate new revenues for city
_____	Streamline interaction between citizens and government
_____	Promote city image/brand
_____	Enhance health education, telemedicine, patient monitoring, etc.
_____	Improve efficiency of government service delivery
_____	Enhance education; improve interaction between teacher/student/parent
_____	Stimulate more private investment and competition for broadband services
_____	Promote job/business growth, economic development
_____	Improve experience for visitors to city, tourists, business travelers
_____	Provide backup/contingency for disaster response/recovery

Objectives

Goal/Objective	Aggregate Priority
Lower broadband prices for low-income, disadvantaged	HIGH
Reduce existing or avoid future government telecom costs	HIGH
Promote city image/brand	HIGH
Improve efficiency of government service delivery	HIGH
Enhance education; improve interaction between teacher/student/parent	MEDIUM
Promote job/business growth, economic development	MEDIUM
Improve public safety through better communication and interoperability	MEDIUM
Improve experience for visitors to city, tourists, business travelers	MEDIUM
Generate new revenues for city	LOW
Streamline interaction between citizens and government	LOW
Enhance health education, telemedicine, patient monitoring, etc.	LOW
Provide backup/contingency for disaster response/recovery	LOW
Stimulate more private investment and competition for broadband services	LOW

Policies: best practices used by Wireless Communities Georgia

- **Public/Private Partnership**
- **Open Access**
- **Open to Many Types of Users**
- **Emergency Management Prioritization**
- **Network Neutrality**

- **Additional considerations**
  - Privacy
  - Child Protection
  - Free Service

Community Input and Outreach

Supply (Assets and Capabilities)	Government	Demand (Needs & Requirements)
	Residents	
	Tourists	
	Business Travelers	
	Foundations	
	Non-Profits	
	Universities	
	Schools	
	Businesses	
	Agencies/Utilities	
	Vendors	
	Healthcare Agencies	

Method	Type of Stakeholders	Type of Feedback	Directness
Focus Groups	Representatives	Mixed	Indirect, by proxy
Town Hall Meetings	Open public	Qualitative	Mixed
Surveys	Hard to reach	Quantitative	Direct

Market Assessment: Municipal Demand

Department	Total # of Employees	% of Mobile Employees	# of Mobile Employees
Police and Fire Services	922	50%	461
Management and Professional Staff	343	25%	85
Technicians, Clerical and Administrative Services	321	10%	32
Service and Maintenance	218	50%	109
Classroom Staff	2,177	10%	217
Board of Education Administration and Principals	449	25%	112
Board of Education Support Staff	817	25%	204
Totals	5,247	N/A	1,222

Municipal Applications

Applications/Timeline	Already Deployed	Planned for < 6 Months	Planned for > 6 Months	No Plans
Municipal Operations				
Workforce management		•		
Remote access to email and calendar	•			
Real-time work order issuance		•		
Inventory tracking	•			
Access to GIS records			•	
Law Enforcement				
CDPD/cellular replacement				•
Access to local databases	•			
Remote access to police reporting system	•			
In-car insurance verification				•
Remote issuance of citations			•	
Transmission of video				•
Portable surveillance			•	
Fire				
Remote access to current Hazardous Material maps			•	
Vehicle location			•	
Firefighter location and transmission of biometric data			•	
Fire inspector remote access and report submission			•	
Arson investigators	•			
EMT reporting to firehouse	•			
Transportation				
Coordination of traffic signals	•			
Intelligent Transportation Systems				•
Variable message signs (Amber Alert)			•	
Variable speed limit signs				•
Video monitoring of traffic flow	•			
Electronic tolling				•
Real-time probe vehicles				•
Traffic sensors	•			

Market Assessment: Commercial Demand

Summary Subscriber Demographics	Year 1	Year 2	Year 3	Year 4	Year 5
Residential					
Homes Passed	47,000	47,000	47,000	47,000	47,000
Coverage (Square Miles)	22	22	22	22	22
Homes Passed / Square Mile	2,136	2,136	2,136	2,136	2,136
Percentage Uptake	5%	13%	16%	18%	18%
Average Residential Subscribers	2,350	6,110	7,520	8,460	8,460
Business					
Businesses Passed	2,305	2,305	2,305	2,305	2,305
Coverage (Square Miles)	22	22	22	22	22
Business Passed/Square Mile	105	105	105	105	105
Percentage Uptake	4%	11%	13%	15%	15%
Average Business Subscribers	92	254	300	346	346

Business Model: High Level Cost Categories

- **Capital Expense**
  - Up-front
  - Ongoing
- **Operating Expense**
  - Fixed
  - Variable

Business Model – Expenses for a Network

- **Capital Expenses**
  - Wi-Fi
  - Backhaul / Distribution
  - NOC
  - Engineering and deployment
  - Equipment refresh

- **Operational Expenses**
  - Marketing
  - Retail provisioning
  - CPE fulfillment
  - Customer support
  - Roaming settlement
  - Network planning & operations
  - General management
  - Internet provisioning
  - Portal / content?
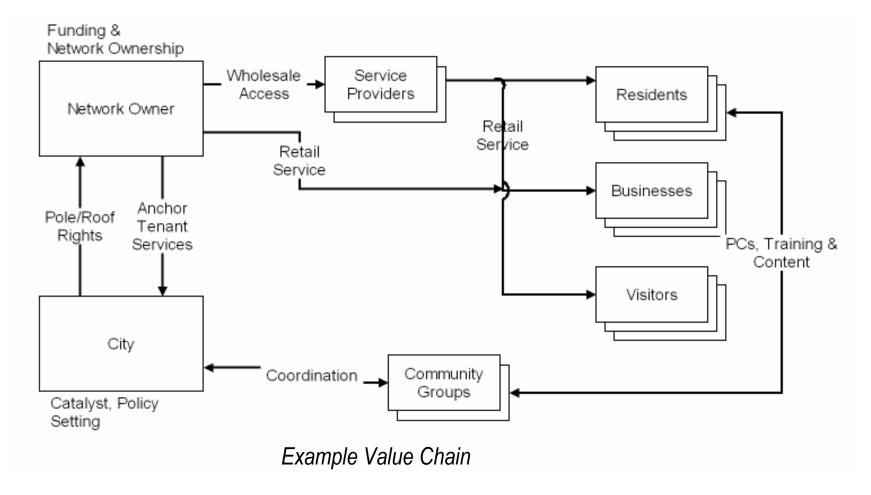 - Pole / electricity fees

Business Model – Income / Savings

Income

- **Consumer subscriptions**
- **Business subscriptions**
- **Roaming settlement**
- **Advertising on portal / other content**

Cost Avoidance / Savings

- **T1 replacement**
- **Public Safety / Field staff data subscriptions**
- **Productivity improvements**
- **Citizen savings**

WCG Recommends Public Private Partnership

Example Value Chain

Key Business Terms of a Public Private Partnership

- **Permission to use City assets**
- **Anchor tenant services**
- **Regulated and/or subsidized rates**
- **Revenue sharing**
- **Term and termination**
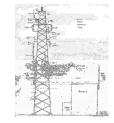- **Exclusivity**
- **Governance**

City Assets and Terms of Use

- **Assets**
  - Optical Fiber, Ducts, Conduit
  - Copper
  - Communications Towers
  - Building Rooftops
  - Utility and/or Street Light Poles
  - Water Towers
  - Electricity
- **Terms of Use**
  - Permission to use, and for what purpose
  - Ability to assign permission to use
  - Reasonable rates
  - Term length

Lessons Learned

- **Don't simply model for coverage**
- **Integrate "Year Zero" into the model**
- **Be conservative**
  - Subscriber uptake
  - Up-side revenue
- **Account for price erosion, subscriber churn**
- **Research pole attachment and bulk-rate electricity costs**
- **Integrate working capital reserve for upgrades**
- **Don't underestimate CPE subsidies**
- **Attempt to quantify total economic benefit to the community, not simply ROI**

Service Requirements

- **Coverage Areas**
- **Usage Models**
  - Fixed
  - Nomadic
  - Portable/Mobile
- **Bandwidth/Throughput**
- **Service Levels**
- **Latency**
- **Legacy Integration**
- **Customer Premise Equipment (CPE)**
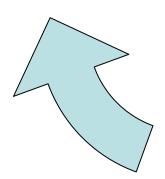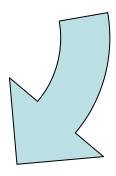
Services Offered: Example from Philadelphia

Service Types	Definition	Pricing
Residential Fixed & Nomadic Service	Access for a single device, provisioned for primary use at a residence, with access throughout the City. Service features include 1 Mbps symmetric.	$9 wholesale, $20 retail
Low Income Fixed & Nomadic Service	Same as Residential Fixed & Nomadic service	$10 retail, maximum of 33% of total residential accounts
Standard Business Service	Access for multiple devices, provisioned for primary use at a business location. Service features include 3 Mbps symetric access (services levels may vary by retail provider)	$100 retail, bundles available for Nomadic service
Occasional Use Nomadic Service	1 Mbps symmetric access for a daily or weekly fee. Marketed to 5.8 million visitors to city yearly (tourists and business travelers)	$2.50/day wholesale, $5 retail
Government Fixed and Mobile	Fixed access with services such as secure (VPN & Firewall) access	Negotiated as free accounts for City use

Final Planning Thoughts

- **RF Study is desired, but rare at early stage**

- **After planning activities above, Financial estimates should be more straightforward**

- **Innovative Market**
  - Planning is never complete - iterative

Q&A

Lunch!

Be Back for <u>1 PM Start</u> for Video

Videos

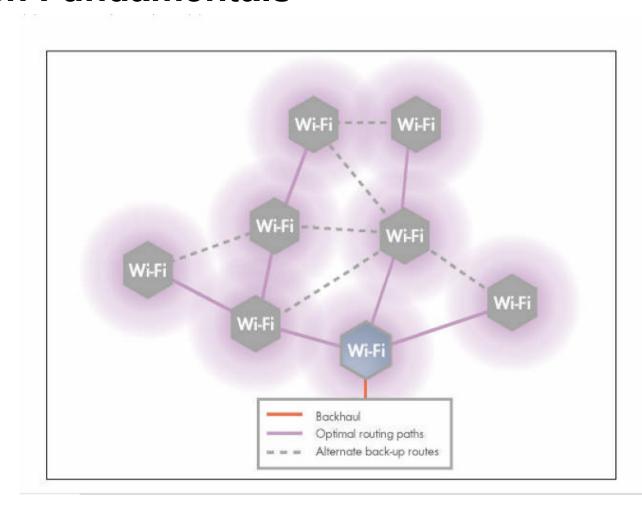## *Leadership, Potential, and Synergies*

Video

New Orleans Post Katrina

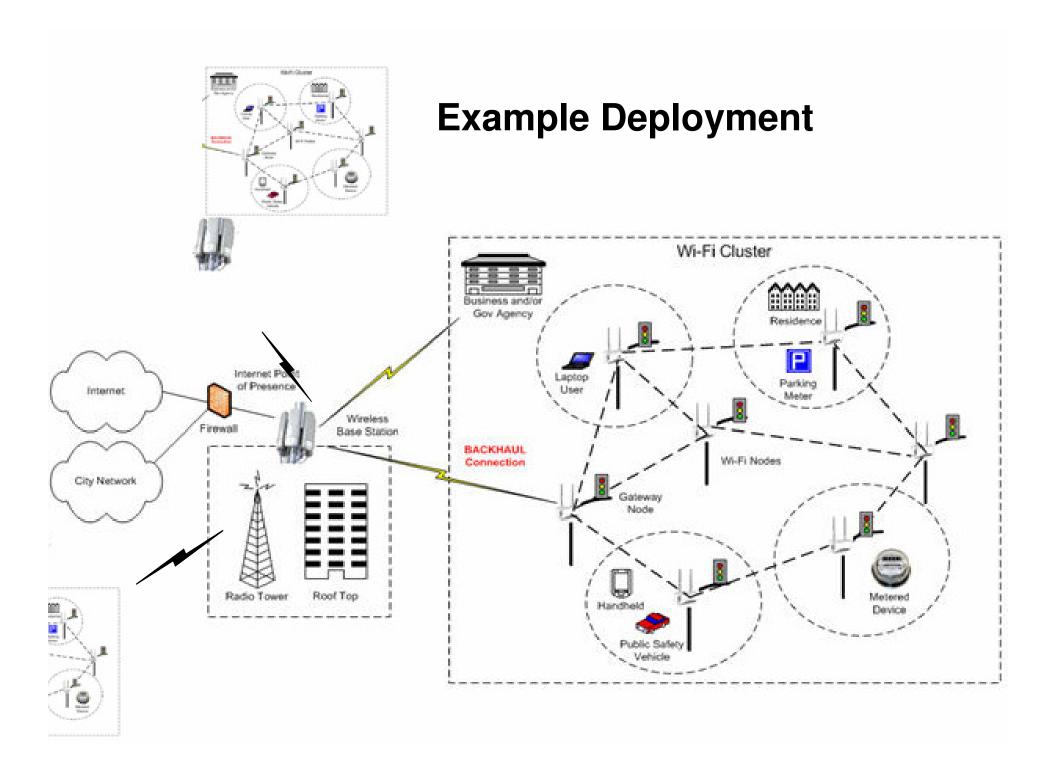# Technology Overview

Mesh Fundamentals

Reference Architecture

- **Network tiers**
    - Last mile
    - Backhaul
    - Distribution
    - Core
- **Standards vs. proprietary**
- **Obsolescence risks**
- **Validated against service requirements**

Example Deployment

Example Technology Components

Built-in Wi-Fi Interface

Dedicated Wi-Fi CPE

Wi-Fi Mesh Node

Wireless Backhaul Node

Wireless Base Station Node

Wireless Distribution Nodes

Q&A and Break

Navigating Wi-Fi Challenges

Thinking beyond the Network

Types of Challenges

- **Philosophical – Is it Right for Cities to be Involved?**

- **Involvement – Balancing input with action**

- **Policies – Municipalities are in uncharted waters**

- **Financial – Capital and ongoing operation**

- **Governance – Network and operator oversight**

Why Should Cities Get Involved in Broadband?

- **FCC has re-enforced "facilities based competition", not enough competition today**

- **Communities recognize the connection between broadband infrastructure and community well-being**

  - Economic development and local/regional/global competitiveness

  - Social issues, digital divide

  - Efficiency in government or public safety

- **Barriers to entry have lowered**

  - Unlicensed spectrum

  - Standardization through silicon-based architectures and mass manufacturing

  - Maturation of Wi-Fi technology

  - Ubiquity of client devices, reducing subscriber acquisition costs and streamlining the provisioning process

Counter Argument: Why Not?

- **Use of public funds creates unfair competition with private sector**

- **Regulators (cities) should not compete against those they regulate**

- **Public funding of infrastructure acts as disincentive for private sector investment**

- **Risk of obsolescence due to rising operating costs and changes in leadership**

- **Cities can cross-subsidize losses from other utilities**

- **Cities not capable of running a complex communications business**

Balancing Involvement

- **Power of these projects in their community involvement**
  - Educational
  - Professional
  - Civic
  - Interest Groups
- **Many such groups don't see the whole picture however**
- **"Technology at the speed of government"**

Policies

- **Municipalities have new opportunities to shape their communities**

- **Number and scope of potential options can be daunting**

- **WCG has provided assistance by setting preferences in the program**
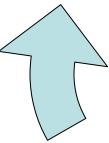
Financial

- **Public Private partnership**
  - Is it a Franchise?
  - Mounting asset compensation
  - Revenue share?
- **Municipal owned**
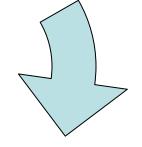 - Raising capital can be challenging

Governance

- **Rates over term of contract**
- **Technology upgrades**
- **Products and services**
- **SLA**
- **Audit rights**
- **T&Cs such as termination, march-in, bonding for removal, etc**

Business Model

Private Partner

Regulations & Policies

Vision & Objectives

Additional Potential Pitfalls

- **Redlining**
- **Thin Layer of Wi-Fi**
- **Over selling leading to disappointment**

What Makes It Worth It

Final Q&A

What else can we do to make you successful?

Closing

Rich Calhoun

Georgia